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Development of EEG-based stress index

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ABSTRACT

This paper presents a non-parametric method to produce stress index using Electroencephalogram (EEG) signals. 180 EEG datasets from healthy subjects were evaluated at two cognitive states; resting state (Eyes Closed) and working state (Eyes Open). In working cognitive state, subjects were asked to answer the Intelligence Quotient (IQ) test questions. The EEG datasets were categorized into 4 groups. Energy Spectral Density (ESD) ratios and Spectral Centroids (SC) from the two tasks were calculated and selected as input features to k-Nearest Neighbor (k-NN) classifier. Shannon's Entropy (SE) was used to detect and quantify the distribution of ESD due to stressors (stress factors). The stress indexes were assigned based on the results of classification, ESD ratios, SC and SE. There were 3 types of stress indexes can be assigned which represent the stress level (low stress, moderate stress and high stress) at classification accuracy of 88.89%. The regression coefficient of the SC of Beta and Alpha was 77%.

KEYWORDS

Cognitive states; EEG; Energy spectral density; Shannon entropy; Spectral centroids; k-NN; Stress index

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